

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
3 June 2004 (03.06.2004)

PCT

(10) International Publication Number  
**WO 2004/045839 A1**

(51) International Patent Classification<sup>7</sup>: **B29D 30/24**

(21) International Application Number:  
PCT/NL2003/000814

(22) International Filing Date:  
19 November 2003 (19.11.2003)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:  
1021958 20 November 2002 (20.11.2002) NL

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(81) Designated States (*national*): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, EG, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT (utility model), PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

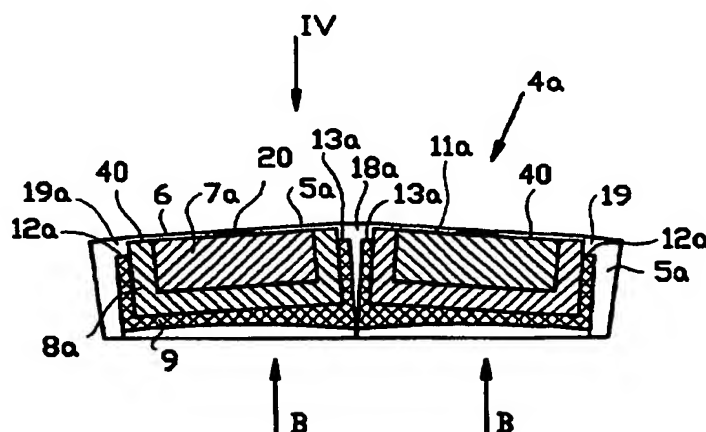
(84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declaration under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN,

[Continued on next page]

(54) Title: **BELT AND TREAD DRUM**



(57) Abstract: Belt and tread drum (1), particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members (4) arranged at the circumference of the drum, which are provided with a support surface for the tyre component, wherein the support members comprise magnet sets having magnets (7a, 7b) for by magnetically attracting the metal parts retaining the tyre component on the support surface, wherein the magnet sets comprise holders (8a, 8b) for the magnets and are placed from the radial inside in the support members, wherein the drum at the circumferential side comprises first portions that engage over the holders in tangential and/or axial direction of the drum, wherein the drum at the circumferential side comprises second portions that engage over the magnets in tangential and/or axial direction of the drum.



IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

### Belt and tread drum

The invention relates to a belt and tread drum. The invention particularly relates to a drum on which a belt layer and a tread layer can be arranged to be shaped into a circumferential whole.

5 Known are belt and tread drums that are provided with magnets in order to retain the tyre component on the drum surface by magnetic influence on the metal parts, such as steel wires, incorporated in said tyre component arranged on the drum. The drum surface is defined by a series of parallel, elongated support members that are each provided with a number of  
10 magnets. The support members are separately attached on the drum and at the radial outside provided with elongated recesses, in which the magnets are accommodated with the intermediary of a tray-shaped steel holder. The magnet is glued in the holder and the holder is glued in the recess.

15 In operation such belt and tread drums are rotated at high speed, which results in considerable centrifugal forces on the holders and the magnets. As a result of a faulty glue connection, which may or may not be due to wear/fatigue, it may happen that a magnet, possibly including the holder, drops out of the drum or is slung from the drum. This is a big safety hazard.

20

It is an object of the invention to improve on this.

From one aspect the invention to that end provides a belt and tread drum, particularly for shaping a belt layer and/or tread layer or another tyre  
25 component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of

the drum, which are provided with a support surface for the tyre component, wherein the support members comprise magnet sets having magnets for by magnetically attracting the metal parts retaining the tyre component on the support surface, wherein the magnet sets comprise holders for the magnets  
5 and are placed from the radial inside in the support members, wherein the drum at the circumferential side comprises first portions that engage over the holders in tangential and/or axial direction of the drum, wherein the drum at the circumferential side comprises second portions that engage over the magnets in tangential and/or axial direction of the drum.

10

In comparison to the known belt and tread drum discussed above, the magnet sets are arranged in the support members from the inner side that is opposite the support surface. As a result the magnets are stopped in radial outward direction so that they cannot inadvertently get detached from the  
15 drum. The preferably tray-shaped holders are thus also stopped radially to the outside in a simple and reliable manner.

20

It is noted that from US Patent specification 4.923.554 a belt drum is known, wherein the support members are radially expandable in order to increase the diameter of the drum, wherein cover plates are attached on the support members, which extend in circumferential direction of the support member in question in order to cover the intermediate space between the support members in the radially expanded positions. The cover plates form support surfaces and cover the elongated recesses in the underlying part of  
25 the support members, which recesses open radially to the outside. In said recesses magnets attached on plates are arranged from the radial outside.

25

Preferably the first portions and/or second portions of the drum are part of the support surfaces, so that a simple structure is achieved.

30

Preferably the first portions or the support surfaces extend over the entire surface of the magnets. This does not only result in a further simplified

structure, but the support surface is question also provides a support surface that continues over the magnets.

In a simple easy-to-assemble and highly user-safe embodiment the support  
5 surfaces are formed as one unity with the support members.

The second portions may, alternatively or additionally to the support surfaces formed by support members, be formed by the holders.

10 In a further development of the belt and tread drum according to the invention the first and/or second portions of the drum form inclined wedge planes, that cooperate with complementary wedge planes that are formed on the magnet holders and/or magnets, respectively. The wedge planes offer a  
15 simple and reliable confinement in radial outward direction and have a directional component that is radially oriented to the inside.

Preferably the holders are manufactured of steel, due to which the effectiveness of the magnets is enhanced.

20 From a further aspect the invention provides a belt and tread drum, particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of the drum, which are provided with a support surface for the tyre component,  
25 wherein the support members are provided with magnet sets having magnets for by magnetically attracting the metal parts retaining the tyre component on the support surface and with holders for the magnets, wherein the drum at the outer side comprises confining portions that form a unity with the support members, which confining portions confine the magnets and/or the  
30 holders in radial outward direction of the drum.

The holders themselves can also form such confining portions that engage

over the magnets in tangential and/or axial direction of the drum.

The holders can be secured in the support members by means of glue applied from the radial inside.

5

In these cases it is also possible that the confining portions are formed by wedge planes that cooperate with wedge planes on the magnets and/or the holders.

10 In case the support surfaces at the location of the magnets are provided with a marking, the operator can easily see -even with the said continuous support surface- where the magnets are located in the drum and correctly arrange the tyre components.

15 From a further aspect the invention provides a belt and tread drum, particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of the drum, which are provided with a support surface for the tyre component,  
20 wherein magnets are accommodated in the support members for by magnetically attracting the metal parts retaining the tyre component on the support surface, wherein the support members comprise portions that are formed as one unity with it that engage over the magnets in tangential and/or axial direction of the drum.

25

Preferably the magnets are accommodated in holders that are placed from the radial inside in the support members, wherein the support members at the circumferential side comprise portions that engage over the holders and/or over the magnets in tangential and/or axial direction of the drum.

30

Preferably the said portions are also part of the support surfaces.

The invention furthermore provides a support member intended and suitable for use in a belt and tread drum according to the invention.

5 The invention will be elucidated on the basis of an exemplary embodiment shown in the attached drawings, in which:

Figure 1 shows a perspective view of a part of a belt and tread drum according to the invention, which for reasons of illustration includes several types of support surfaces according to the invention;

10

Figure 2 shows a cross section of a first embodiment of a support member according to the invention;

15

Figure 3 shows a cross-section of a second possible embodiment of a support member according to the invention;

Figure 4 shows a view according to IV in figure 2; and

20

Figure 5 shows a view according to V in figure 3.

25

The belt and tread drum 1 shown in part in figure 1 has a support/drive shaft 2, which with means that are not further shown can be rotated very fast in the direction A. The drum surface 3 consists of segments, namely support members 4, in which magnets are accommodated. During the fast rotation of the drum 1, said magnets are able to retain tyre components (not shown) that have been arranged on the drum surface 3. This is known per se. The support members 4 are detachably attached to the drum 1.

30

Two possible support members 4a, 4b according to the invention are shown in figures 2 and 4, and 3 and 5, respectively.

The support member 4a of figure 2 comprises an aluminium body 5a, which

at the upper side as considered in the drawing, that is the radial outside of the drum, defines a closed surface. From the side B recesses formed in the aluminium body 5a are accessible, which recesses in fact form blind holes 40. In said recesses 40 a pair of steel trays 8a are accommodated, in which  
5 magnets 7a are attached with glue. The upper surface 6 of the magnets 7a is aligned with the upper surface of the tray 8a in question. A support surface 11a forming a unity with the aluminium body 5a extends over it. It can be seen that the magnets 7a and the trays 8a are confined to the outside by the aluminium material due to the aluminium thus continuing over them.

10

The trays 8a are fitted within steps 18a, 19a in the aluminium body 5a. Around it, from the inside B, a glue layer 9 is applied to secure the trays 8a in the aluminium body 5a, wherein the glue may extend up to the surfaces 12a, 13a of the steps 18a, 19a.

15

At the upper side elongated markings 20 are arranged in the support surface 11a, as can also be seen in figures 1 and 4.

20

In figure 4 the support member 4a is shown with holes 22 for mounting on the drum 3, and with holes 21 by which means an additional series of support members 4a can be attached on the already present support members 4a and can be removed from them again, if an increase/reduction of the diameter of the drum 3 is desired.

25

In the alternative embodiment of the support member 4b shown in figures 3 and 5 the aluminium body 5b does not form blind holes, but through-holes. Holes are now limited at the location of the outer surface by shoulders 18b, 19b, that are provided with inclined planes 14, which inclined planes are able to cooperate with inclined planes 15 formed at the edges of the trays 8b.

30

The trays 8b themselves are provided with slightly tapering walls 30, in between which the magnets 7b, shaped correspondingly inclined, have been inserted in longitudinal direction. The magnets 7b are thus stopped radially to



the outside by wedge action, and the holders 8b are also stopped radially to the outside due to contact between the inclined planes 14 and 15.

Also in this case, the holders 8b with magnets 7b are inserted into the aluminium body 5b from the inside in the direction B, and subsequently secured with glue 9. A support member 4b as shown in figure 5 is for instance thus achieved, which in the same manner as support member 4a can be secured on the drum 1. In case of support members 4b the surface 6 of the magnet 7b will extend into the surface of the aluminium body 5b. No marking is necessary then, as can be seen in figure 1.

It will be understood that the invention of figure 2 can be supplemented by the way of confining a magnet according to figure 3.

Furthermore an embodiment is possible in which the aluminium body itself forms a wedge-shaped confinement for the magnets, and a step or wedge plane for the confinement of the holders for the magnets.

In figure 1 it is further shown that support members 4c and 4d comparable to support member 4a can be arranged on the drum 1, wherein the location of the magnets is shifted in shaft direction. This arrangement has to do with the diamond shape of the tyre components, wherein there is question of a tapering leading end and a tapering trailing end. By means of the markings 20 the operator is able to correctly position the tapering leading end.

## Claims

1. Belt and tread drum, particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of the drum, which are provided with a support surface for the tyre component, wherein the support members comprise magnet sets having magnets for by magnetically attracting the metal parts retaining the tyre component on the support surface, wherein the magnet sets comprise holders for the magnets and are placed from the radial inside in the support members, wherein the drum at the circumferential side comprises first portions that engage over the holders in tangential and/or axial direction of the drum, wherein the drum at the circumferential side comprises second portions that engage over the magnets in tangential and/or axial direction of the drum.
2. Belt and tread drum according to claim 1, wherein the first portions of the drum are part of the support surfaces.
3. Belt and tread drum according to claim 2, wherein the second portions of the drum are part of the support surfaces.
4. Belt and tread drum according to claim 3, wherein the support surfaces extend over the entire surface of the magnets.

5. Belt and tread drum according to claim 1, 2 or 3, wherein the magnets are part of the support surfaces.

6. Belt and tread drum according to any one of the preceding claims, wherein  
5 the support surfaces are formed as one unity with the support members.

7. Belt and tread drum according to any one of the preceding claims, wherein the second portions of the drum are formed by the holders.

10 8. Belt and tread drum according to any one of the preceding claims, wherein the first and/or second portions of the drum form inclined wedge planes, that cooperate with complementary wedge planes that are formed on the magnet holders and/or magnets, respectively.

15 9. Belt and tread drum, according to any one of the preceding claims, wherein the holders are tray-shaped.

10. Belt or tread drum according to any one of the preceding claims, wherein the holders are manufactured of steel.

20

11. Belt or tread drum, particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of the drum, which are provided with a support surface for the  
25 tyre component, wherein the support members are provided with magnet sets having magnets for by magnetically attracting the metal parts retaining the tyre component on the support surface and with holders for the magnets, wherein the drum at the outer side comprises confining portions that form a unity with the support members, which confining portions confine the  
30 magnets and/or the holders in radial outward direction of the drum.

12. Belt and tread drum according to claim 11, wherein the holders

themselves form confining portions that engage over the magnets in tangential and/or axial direction of the drum.

5 13. Belt and tread drum according to claim 11 or 12, wherein the confining portions are formed by wedge planes that cooperate with wedge planes on the magnets and/or the holders.

10 14. Belt and tread drum according to any one of the preceding claims, wherein the support surfaces at the location of the magnets are provided with a marking.

15 15. Belt and tread drum provided with one or more of the characterising measures described in the attached description and/or shown in the attached drawings.

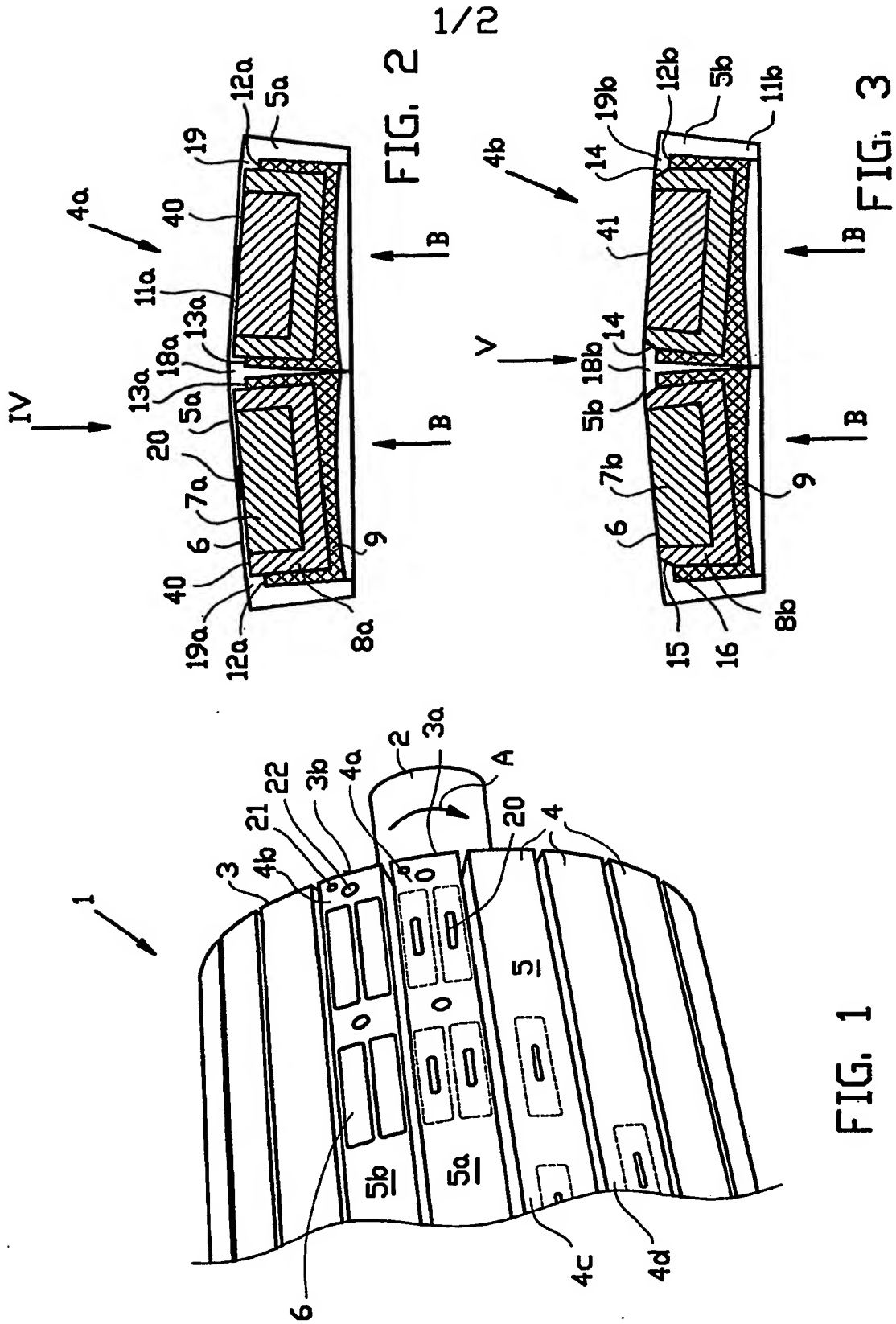
16. Support member intended and suitable for use in a belt and tread drum according to any one of the preceding claims.

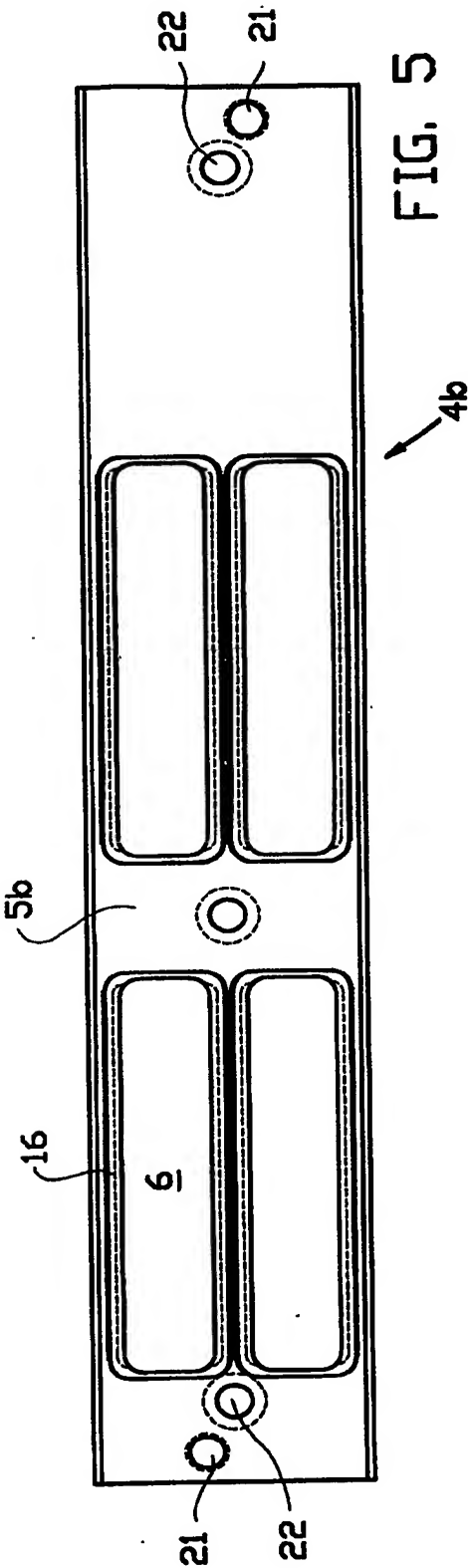
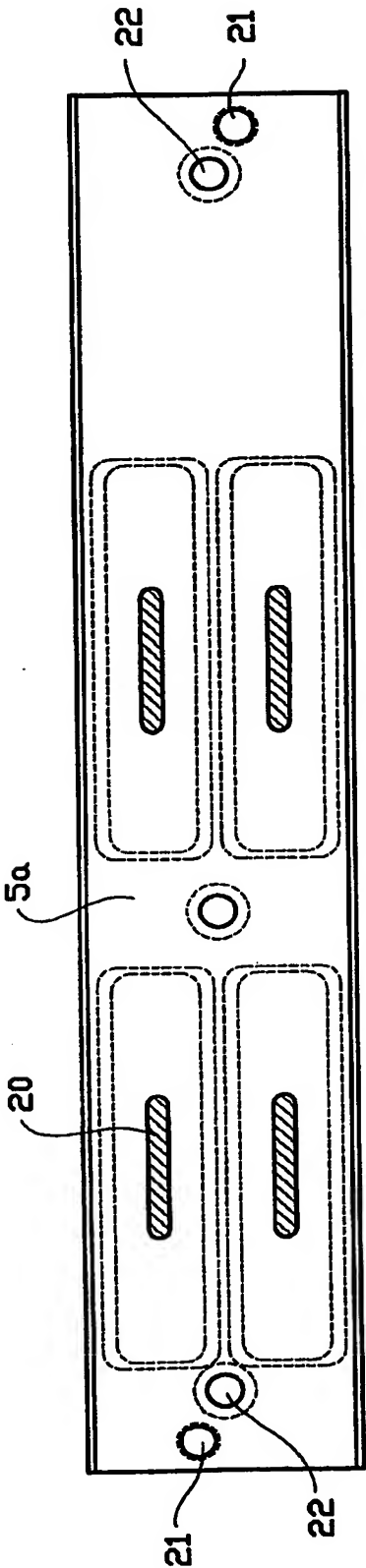
20 17. Belt and tread drum, particularly for shaping a belt layer and/or tread layer or another tyre component provided with metal parts into a circumferential whole, comprising one or more support members arranged at the circumference of the drum, which are provided with a support surface for the tyre component, wherein magnets are accommodated in the support members for by magnetically attracting the metal parts retaining the tyre component, wherein the support members comprise portions that are formed as one unity with it that engage over the magnets in tangential and/or axial direction of the drum.

25 30 18. Belt and tread drum according to claim 17, wherein the magnets are accommodated in -preferably tray-shaped- holders that are placed from the radial inside in the support members, wherein the support members at the circumferential side comprise portions that engage over the holders and/or

over the magnets in tangential and/or axial direction of the drum.

19. Belt and tread drum according to claim 17 or 18, wherein the said portions are also part of the support surfaces.





## INTERNATIONAL SEARCH REPORT

PCT/NL 03/00814

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B29D30/24

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B29D H02K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 04, 2 April 2003 (2003-04-02) -& JP 2002 361758 A (SUMITOMO RUBBER IND LTD), 18 December 2002 (2002-12-18) abstract; figures 1,2,5A,5B ---	1-19
X	US 4 923 554 A (OZAWA CHIAKI) 8 May 1990 (1990-05-08) column 1, line 5 - line 8 column 4, line 7 - line 28; figures 1-3 ---	11,17
X	DE 11 75 870 B (CONTINENTAL GUMMI-WERKE) 13 August 1964 (1964-08-13) the whole document ---	11,17
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
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- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

19 February 2004

Date of mailing of the international search report

27/02/2004

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## INTERNATIONAL SEARCH REPORT

PCT/NL 03/00814

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 066 354 A (BENJAMIN GARY H) 19 November 1991 (1991-11-19) column 1, line 6 - line 13 column 5, line 1 - line 8; figure 6	1-19
A	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 12, 31 October 1998 (1998-10-31) -& JP 10 191586 A (JAPAN SERVO CO LTD), 21 July 1998 (1998-07-21) abstract; figure 1	1-19
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Information on patent family members

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